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Education

2012 Ph.D. Environmental Sciences, University of Virginia
2008 M.S. Environmental Sciences, University of Virginia
1987 B.A. International Politics, University of Pennsylvania

Professional Experience

2018-present Science Information Manager, Mars 2020 Perseverance Rover

In this position, I am responsible for managing sampling-related data generated by the Perseverance rover as it collects rock and regolith samples for eventual return to Earth. In this capacity, I work with engineers, programmers, archivists, and other scientists to ensure that there is a comprehensive record for each sample and that all data meet Planetary Data System standards.

2018-present SHERLOC Instrument Science Team Collaborator

I participated in the development and assembly phases of the SHERLOC raman and fluorescence instrument. I work in collaboration with the SHERLOC team to interpret data related to detection of organic matter.

2015-present Research Director, Astrobiogeochemistry Laboratory, JPL/California Institute of Technology

I oversee a diverse biosignatures laboratory facility that includes sample preparation for stable isotope and organic geochemical analyses, mass spectrometry, elemental analysis, gas chromatography, light microscopy, scanning electron microscopy, and EDS. Research focuses on developing methods for returned sample analysis, biogeochemistry of ancient and modern Mars-analog environments, and Earth/life system history. I manage the nascent MARSnet program which seeks to prepare the analytical community for Mars sample return through the collection of high-fidelity Mars analogues and distributed analysis in leading laboratories around the world. I also maintain the Mars Analogue Digital Library, a standards-based, web accessible catalog of all abcLab samples and related data.

2013-2015 Caltech Postdoctoral Scholar, Jet Propulsion Laboratory /California Institute of Technology

Working under the supervision of Dr. Kenneth Williford in the newly established Astrobiogeochemistry Laboratory, I conducted stable isotope and organic geochemical investigations of Mars-analog terrestrial rocks in anticipation of eventual sample return.

2013 Project Scientist, Virginia Division of Geology and Mineral Resources 2013

As part of a Department of Energy-funded CO₂ sequestration research project, I developed and implemented a plan to monitor and evaluate the emplacement and fate of CO₂ injected into deep coal seams in southwest Virginia using stable isotopes of C, H, O, and S.

1996-2006 Director, Digital Media Lab, University of Virginia Library 1996-2006

Founded and managed a media technology facility to serve students and faculty. Managed the development of online data collections in the arts, humanities and natural sciences. Created systems for field data acquisition and data visualization in cooperation with international collaborators. Worked with faculty to develop best practices for incorporation of digital resources into classroom instruction.

Manuscripts

Hickman-Lewis K, Moore KR, Hollis JJR, **Tuite** ML, Beegle LW, Bhartia R, Grotzinger JP, Brown AJ, Shkolyar S, Cavalazzi B, Smith CL. In Situ Identification of Paleoarchean Biosignatures Using Colocated Perseverance Rover Analyses: Perspectives for In Situ Mars Science and Sample Return. *Astrobiology*. 2022 Sep;22(9) 1143-1163.

J. Aramendia, L. Gomez-Nubla, M.L. **Tuite**, K.H. Williford, K. Castro, J.M. Madariaga, 2021. A new semi-quantitative Surface-Enhanced Raman Spectroscopy (SERS) method for detection of maleimide (2,5-pyrroledione) with potential application to astrobiology, *Geoscience Frontiers*, Volume 12, Issue 5,

- Masiero, J. R., Davidsson, B. J. R., Liu, Y., Moore, K., & **Tuite**, M. (2021). Volatility of Sodium in Carbonaceous Chondrites at Temperatures Consistent with Low-perihelion Asteroids. *The Planetary Science Journal*, 2(4), 165.
- Bhartia, et al, (2021). Perseverance's Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals (SHERLOC) Investigation, *Space Science Reviews*
- Tuite**, M.L., Williford, K.H., Macko, S.A. (2019) From Hothouse to Icehouse: Nitrogen Biogeochemistry and the Oxygenation of the Late Devonian Ocean/Atmosphere System. *Palaeogeography, Palaeoclimatology, Palaeoecology*
- Tuite**, M.L, Flannery, D.T., Williford, K.W. (2016). Organic Geochemistry of a High-Latitude Lower Cretaceous Lacustrine Sediment Sample from the Koonwarra Fossil Beds, South Gippsland, Victoria, Australia. *Memoirs of Museum Victoria*.
- Caudill, Christy, Gordon Osinski, Eric Pilles, Haley Sapers, Alexandra Pontefract, Shamus Duff, Joshua Laughton, Jonathan O'Callaghan, Racel Sopoco, Gavin Tolometti, Michael **Tuite**, Kenneth Williford, Tianqi Xie (2020). Field and laboratory validation of remote rover operations Science Team findings: The CanMars Mars Sample Return Analogue Deployment (MSRAD), *Planetary and Space Science*.
- Stamenković, V., et al., 2019. The Next Frontier for Planetary and Human Exploration, *Nature Astronomy*, 3(2) 116-20.
- DiLoreto, Z.A., Bontognali, T.R.R., Al Disi, Z.A. et al. Microbial community composition and dolomite formation in the hypersaline microbial mats of the Khor Al-Adaid sabkhas, Qatar. *Extremophiles*, 23, pages 201–218 (2019).
- D. Flannery, A. Allwood, R. Hodyss, R. Summons, M. **Tuite** and M. Walter. 2018. Microbially-influenced formation of Neoproterozoic ooids. *Geobiology*.
- S. Menachekanian¹, D. T. Flannery, C. M. Heirwegh, M. L. **Tuite**, C. S. Jamieson, R. Hodyss, K. Williford, 2018. Investigating Photochemical Effects of Micro-XRF Analysis on Common Geochemical Compounds. *Advances in X-ray Analysis*, International Center for Diffraction Data
- Ishida, A., Kitajima, K., Williford, K.H., **Tuite**, M.L., Kakegawa, T., Valley, J.W., 2018. Simultaneous in situ analysis of carbon and nitrogen isotope ratios in organic matter by secondary ion mass spectrometry, *Geostandards and Geoanalytical Research*. 42, 2 p 189-203
- Finstad, K.M., Pfeiffer, M., McNicol, G., **Tuite**, M., Williford, K.H., Amundson, R., 2018. A late Quaternary paleoenvironmental record in sand dunes of the northern Atacama Desert, Chile, *Quaternary Research*.
- William J. Abbey, Rohit Bhartia, Luther W. Beegle, Lauren DeFlores, Veronica Paez, Kripa Sijapati, Shakher Sijapati, Kenneth Williford, Michael **Tuite**, William Hug, Ray Reid, 2017. Deep UV Raman Spectroscopy for Planetary Exploration: The Search for In Situ Organics, *Icarus*, <http://dx.doi.org/10.1016/j.icarus.2017.01.039>.
- Haddad, E., **Tuite**, M., Martinez, A., Williford, K., Boyer, D., Droser, M., Love, G., 2016. Lipid biomarker stratigraphic records through the Late Devonian Frasnian/Famennian boundary: Comparison of high- and low-latitude epicontinental marine settings, *Organic Geochemistry*.
- Tuite**, M.L, Flannery, D.T., Williford, K.W., 2016. Organic Geochemistry of a High-Latitude Lower Cretaceous Lacustrine Sediment Sample from the Koonwarra Fossil Beds, South Gippsland, Victoria, Australia. *Memoirs of Museum Victoria*.
- Tuite**, M.L. & Macko, S.A., 2013, Basinward nitrogen limitation demonstrates role of terrestrial nitrogen and redox control of delta N-15 in a Late Devonian black shale, *Geology*, 41(10), pp. 1079-82.

Tuite, M.L. & Macko, S.A., 2010, Biogeochemistry of N and P in a dysoxic/euxinic late Devonian epeiric basin, *Geochimica et Cosmochimica Acta*, 74(12), pp. A1059-.

Cox, B.S., Cox, D.J. & **Tuite**, M. 2001, Driving difficulties among male adolescents, *Journal of Adolescent Health*, vol. 29, no. 5, pp. 312-3.

Data Publications

Tuite, M.L., 2016, Geochemistry of the Daviess 873 core, <http://dx.doi.org/10.18130/V3/QAIK3R>, University of Virginia Dataverse, V1

Tuite, Michael L., et al., (2017), Geochemistry of the Late Devonian VA-1 core. Integrated Earth Data Applications (IEDA). doi:10.1594/IEDA/100679

Professional Activities

Outreach in 2023: Remote site lecture at Dark Sky Festival, Death Valley National Park

Reviewer: Earth and Planetary Science Letters; Geobiology; GSA Bulletin; Petroleum Research Fund; Chemical Geology; Stratigraphy; Palaeogeography, Palaeoclimatology, Palaeoecology

Session Convener/Chair: Goldschmidt, American Geophysical Union, AbSciCon, Geological Society of America

NASA ROSES review panelist for Exobiology and Habitable Worlds

Mentorship: more than 40 international undergraduate interns, graduate students, and post-docs since 2015

Recent field work: Hell Creek, Montana; Pilabara, Western Australia; Qatar; Death Valley, California; Walker Lake, Nevada

Organized workshop at Goldschmidt 2019 on physical sample data management

Searching for Ancient Life on Mars, Are We Alone? Lecture series, UC Riverside – Palm Desert (2019)

Mars 2020 and the Search for Life on Mars, 2018. University of California, Riverside.

CDSCO Paleogeosciences drilling workshop to plan scientific goals for next ten years of continental drilling, 2016

Organized workshops at GSA 2015 and AGU 2016 on data stewardship for physical samples

iSamples Research Coordination Network member 2015 - 2020

MEPAG participant, 2015 - present

EarthCube, Science Committee member, 2014-2020